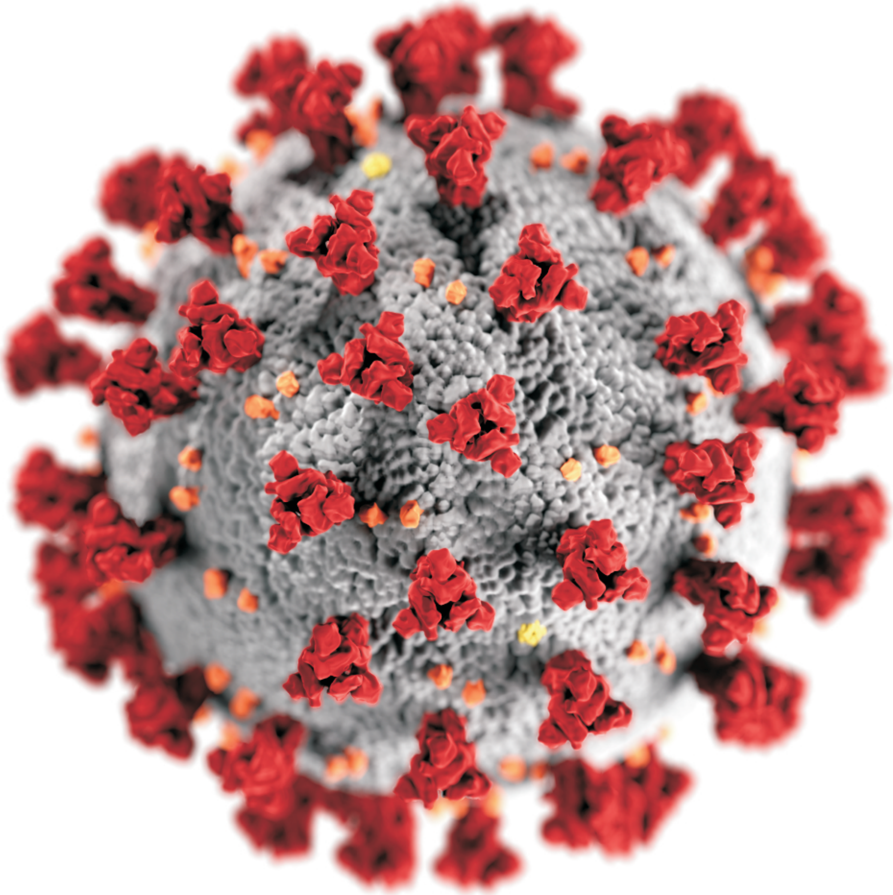
Coronavirus

Facts & Prevention



Shakeer Ahmed

Inspire Educational Society
A non profit science communication organization

Coronavirus

Coronaviruses are a large family of viruses which may cause illness in animals or humans.

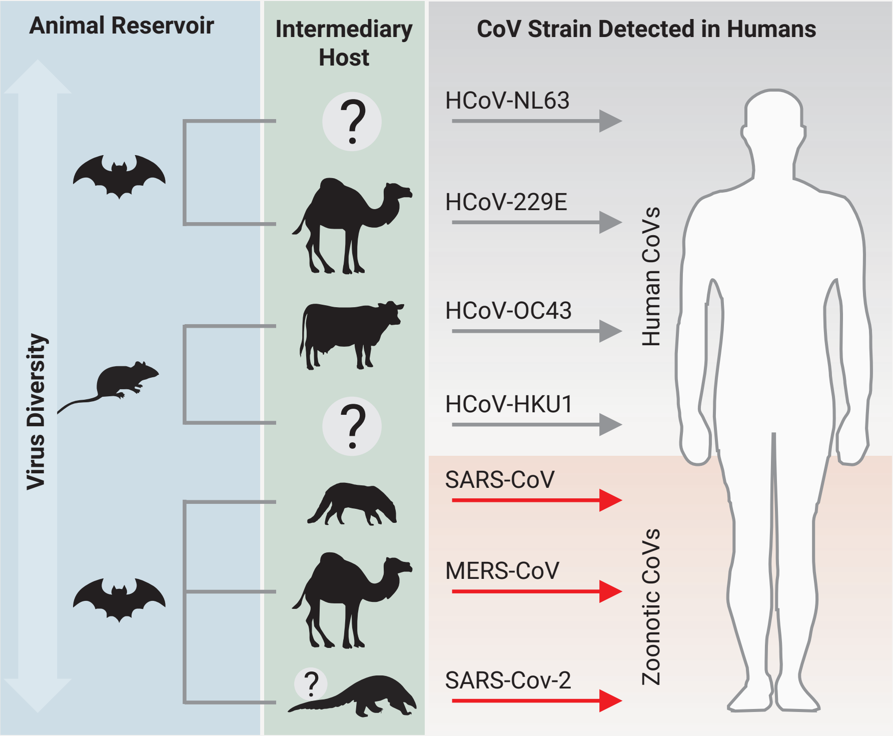
Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009.

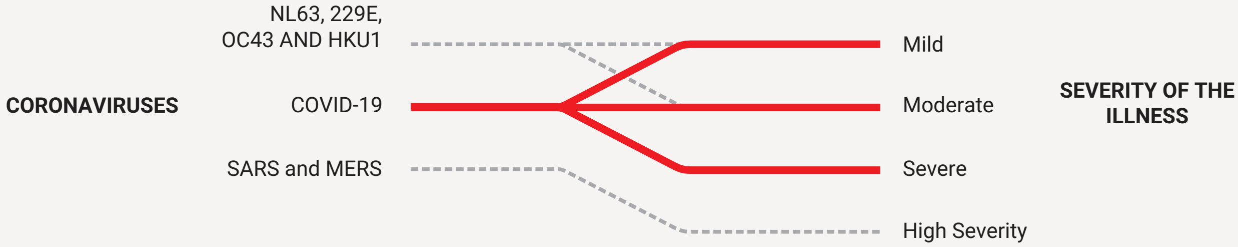
The scientific name for coronavirus is Orthocoronavirinae or Coronavirinae. Coronaviruses belong to the family of Coronaviridae, order Nidovirales, and realm Riboviria. They are divided into alphacoronaviruses and betacoronaviruses which infect mammals – and gammacoronaviruses and deltacoronaviruses which primarily infect birds.

Human coronaviruses were first identified in the mid-1960s. There are more than 200 coronavirus types, but only seven are known to affect people. Four human coronaviruses (HCov-229E, HCov-NL63, HCov-OC43, HCov-HKU1) only cause mild cold- or flu-like symptoms. These are responsible for 15 to 30% of the world's common cold cases every year and are considered endemic.
Three other coronaviruses pose more serious risks they are,
MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS),
SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS),
SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-19)

The Origin

Many coronaviruses that infect humans could be found in bats, which are natural reservoirs of coronaviruses. Bats are likely to be the original host of the novel coronavirus. Transmission from bats to humans might have occurred after mutation via an intermediary host(s). The genomic sequence analysis showed a more than 85% homology between the novel coronavirus and a coronavirus in bats. However, there are several other possible intermediate hosts between bats and humans, in a research Pangolin genomic sequence analysis showed 99% homology and yet to be confirmed. Animal-to-human or human-to-human transmission relies mainly on two routes: contacts and droplets. The main difference lies in the severity of the illnesses they cause. The rest four respiratory viruses range from mild to medium, while Sars and Mers can cause respiratory illness of high severity.




CORONAVIRUSES

NL63, 229E,
OC43 AND HKU1

COVID-19

SARS and MERS

Mild

Moderate

Severe

High Severity

SEVERITY OF THE ILLNESS

Coronavirus

Facts & Prevention

> “ There are more viruses on Earth than stars in the universe. ” — Carl Zimmer

Virus

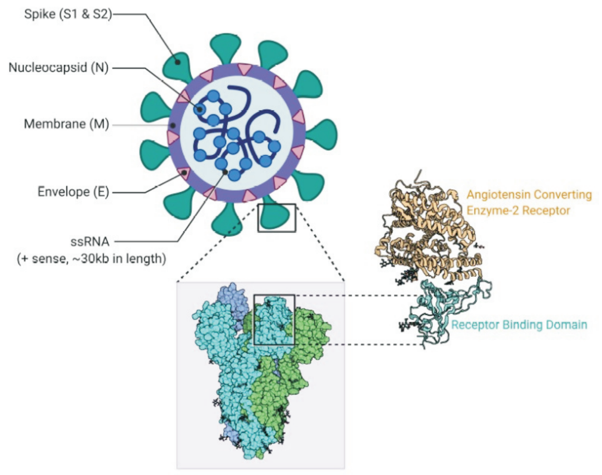
Virus, infectious agent of small size and simple composition that can multiply only in living cells of animals, plants, or bacteria. The name is from a Latin word meaning “slimy liquid” or “poison.”

Viruses are microscopic organisms that require a living cell, often called a host, to multiply. They largely consist of genetic material (either DNA or RNA) wrapped in a protein coat.

These DNA and RNA sequences may change over time, accumulating modifications to the genetic code that favour the survival of the virus. Scientists can look at these genetic sequences to estimate how different viruses are related and how they may have evolved.

These studies have shown us that viruses do not have a single origin; that is, they did not all arise from one single virus that changed and evolved into all the viruses we know today. Viruses probably have a number of independent origins, almost certainly at different times.

SARS-Cov 2 Structure



Onset: Sudden

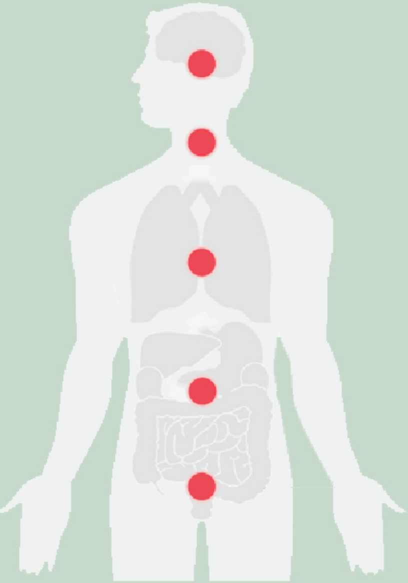
Symptoms

- Fever
- Dry Cough
- Fatigue
- Muscle pain
- Sore throat
- New loss of taste or smell

Less common Symptoms

- Headache
- Coughing up blood
- Diarrhoea
- Persistent pressure in the chest

The list is not complete, call your local health authority if you are unwell.



Incubation

1-14 days

may go up to 27 days

Complications

5% cases

(acute pneumonia, respiratory failure, septic shock, multiple organ failure)

Recovery

2 weeks

severe cases 2-6 weeks

Treatment or vaccine

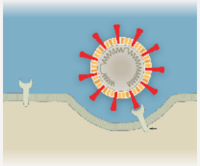
No vaccine or anti-viral drugs avalable; only symptoms can be treated.

Most people will experience mild to moderate symptoms and recover without special treatment.

What it does?

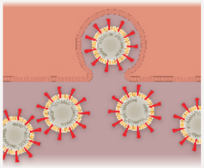
Entering a Vulnerable Cell

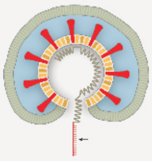
The virus enters the body through the nose, mouth or eyes, then attaches to cells in the airway that produce a protein called ACE2. The virus is believed to have originated in bats, where it may have attached to a similar protein.



Spreading the Infection

Each infected cell can release millions of copies of the virus before the cell finally breaks down and dies. The viruses may infect nearby cells, or end up in droplets that escape the lungs.



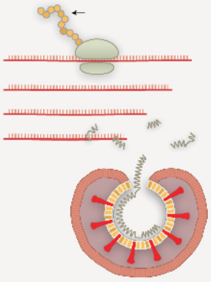


Releasing Viral RNA

The virus infects the cell by fusing its oily membrane with the membrane of the cell. Once inside, the coronavirus releases a snippet of genetic material called RNA.

Making new copies

The infected cell reads the RNA and begins to churn out new spikes and other proteins that will form more copies of the coronavirus.

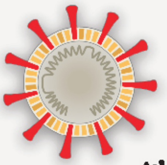


Immune Response

Most Covid-19 infections cause a fever as the immune system fights to clear the virus. In severe cases, the immune system can overreact and start attacking lung cells. The lungs become obstructed with fluid and dying cells, making it difficult to breathe and may lead to death.

Leaving the Body

Coughing and sneezing can expel virus-laden droplets onto nearby people and surfaces, where the virus can remain infectious for several hours to several days. Wear masks to reduce the release of viruses.



Lasts long on surfaces

Plastic/Stainless Steel
up to **2-3 days**

Cardboard
up to **1day**

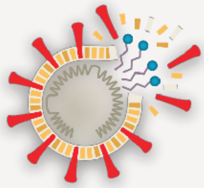
Copper
up to **4 hours**

Common household disinfectants, including soap, 1% sodium hypochlorite or phenolic disinfectants, can deactivate coronaviruses on indoor surfaces.

- Disinfectants (Sanitizers) that are at least 60 percent alcohol by volume can also kill the virus on plastic and stainless steel surfaces.
- Wash your hands with soap and water regularly for at least 20 seconds.
- Wash fruits and vegetables thoroughly with clean water, same way you do in other circumstances.

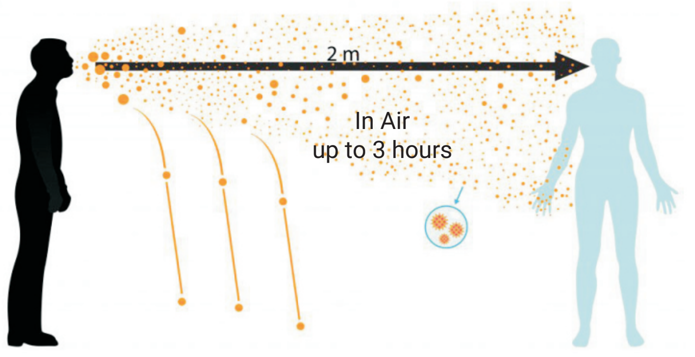
Diluted solution of 1% sodium hypochlorite or household bleach is the most commonly used disinfectant for outdoors. UV light also destroys coronaviruses.

Soap kills the Virus



Soap destroys the virus when the water-shunning tails of the soap molecules wedge themselves into the lipid membrane and pry it apart. The best way to avoid getting infected with the coronavirus is to wash your hands often with soap about 20 seconds.

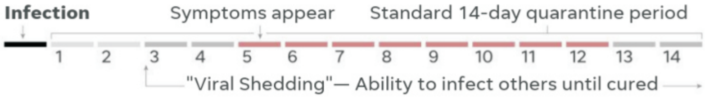
Spread



The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. In a study, from sneeze smaller particles found upto 23-27 feet.
You can be can be infected by breathing in the virus if you are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose or mouth.

Most people who fall sick with COVID-19 will experience mild to moderate symptoms and recover without special treatment. Recent studies have suggested that COVID-19 may be spread by people who are not showing symptoms.

Coronavirus incubation

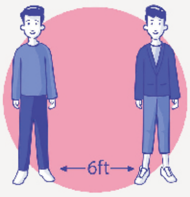

Infection
Symptoms appear
Standard 14-day quarantine period
1
2
3
4
5
6
7
8
9
10
11
12
13
14
"Viral Shedding"— Ability to infect others until cured

Protect yourself

All people should wear cloth face masks in public places where it's difficult to maintain a 6-foot distance from others. This will help slow the spread of the virus from people without symptoms or people who do not know they have contracted the virus. Cloth face masks should be worn while continuing to practice physical distancing.
Avoid touching your face. The virus can survive on surfaces that you touch with your hands. If your hands come into contact with your mouth, nose, and eyes, the virus might enter your body.

Stay at home

Clean your hands often



Avoid close contact

Cover coughs and sneezes

wear a mask if you are sick or in public places

Clean and disinfect

Quarantine is among the most effective ways to control the spread of the novel coronavirus pandemic and to limit its impact on populations across the globe.

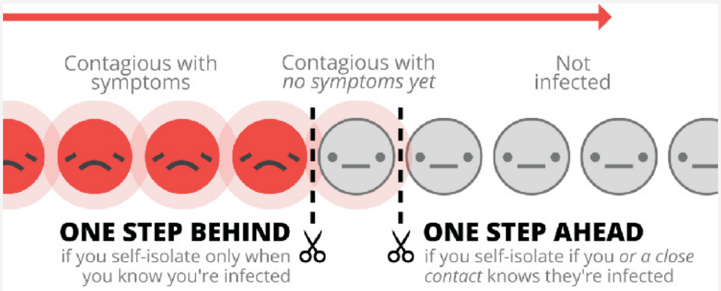
The science behind quarantine as a means to curb contagion is several centuries old.

Isolation separates sick people with a contagious disease from people who are not sick.

Quarantine separates and restricts the movement of people who were exposed to a contagious disease to see if they become sick.

Note: It's critical to reserve surgical masks and N95 respirators for healthcare workers.

Covid-19 Scenario


Contagious with symptoms
Contagious with no symptoms yet
Not infected
ONE STEP BEHIND
if you self-isolate only when you know you're infected
ONE STEP AHEAD
if you self-isolate if you or a close contact knows they're infected

There are four types of Covid-19 patients - Symptomatic, which show the symptoms of the disease like cold, cough, fever; presymptomatic have no symptoms when they test positive but go on to develop symptoms later; atypical symptomatic which show mild symptoms that disappear later and asymptomatic which don't show any symptoms at all.

In India, according to The Indian Council of Medical Research (ICMR), 80% of the Covid-19 cases are asymptomatic (in other countries its 25-50%), which means they do not show any symptoms like cold, cough, fever and they can infect others unknowingly, identifying such patients is a difficult task without large scale testing.

asymptomatic coronavirus patient or a silent spreader is a carrier of the virus who can spread it further as long as they harbor the virus. Usually they are young, have a good immune response and may get rid of the virus quickly. But isolation till they do so is needed.

To minimize spread one should continue practicing physical distancing, personal hygiene, wearing masks and shielding elderly and children in family from people with mobility.

Isolation and quarantine help protect the public by preventing exposure to people who have or may have a contagious disease.

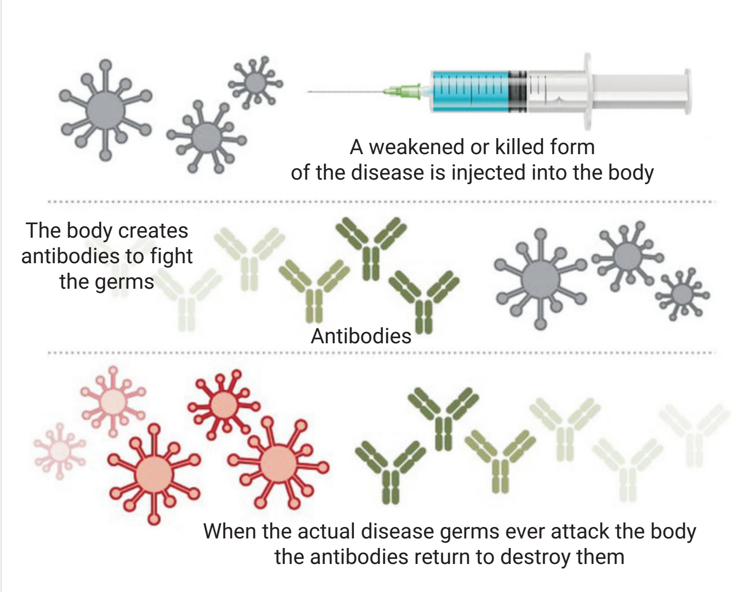
Detecting the virus exposure

When people came into contact with coronavirus, get infected and antibodies in blood designed to fight off infection, even if they never develop symptoms. Antibody test (also known as serology test) can tell whether a person is infected with the coronavirus or not in about 15 minutes. More tests and random tests will help government officials to figure out when it makes sense to ease lockdowns.

Treatment

Most of the people with mild symptoms of covid-19 recover without special treatment. Healthy diet, sleep, regular exercise like yoga will help. Seek medical care if you have fever, cough, and difficulty breathing. There is no medicinal treatment for this coronavirus as it is a new virus, self-care and only symptomatic treatment in case of severe cases.

Several companies are developing or testing existing antivirals against SARS-CoV-2, the virus that causes COVID-19. Antivirals target the virus in people who already have an infection. They work in different ways, sometimes preventing the virus from replicating, other times blocking it from infecting cells. Based on evidence from laboratory, animal and clinical studies, the following treatment options were selected: Remdesivir; Lopinavir/Ritonavir; Lopinavir / Ritonavir with Interferon beta-1a; and Chloroquine or Hydroxychloroquine.


A weakened or killed form of the disease is injected into the body
The body creates antibodies to fight the germs
Antibodies
When the actual disease germs ever attack the body the antibodies return to destroy them

How it works

A vaccine basically trains the immune system to recognize and attack the virus when it encounters it. Vaccines protect both the person who's vaccinated and the community. Viruses can't infect people who are vaccinated, which means vaccinated people can't pass the virus to others. This is known as herd immunity.

Vaccines harmlessly show viruses or bacteria (or even small parts of them) to the immune system. The body's defences recognise them as an invader and learn how to fight them.Then if the body is ever exposed for real, it already knows what to do. Vaccines are given to healthy people as prevention. Preventive vaccines don't treat or cure sickness – they prime your immune system to fight a potential disease.

" If you wear a mask, then you must know how to use it and dispose of it properly." - W.H.O.

A race to save the lives

Developing a safe vaccine which can be mass produced is going to be a time consuming exercise - every lot has to be chemically and biologically tested before being released. It will take minimum 12-18 months to produce a successfully developed vaccine.

Other Options: Scientists are also looking at other options to treat coronavirus such as: Monoclonal antibodies, Blood plasma transfers, Stem cells, Immune suppressants.

Ministry of Science & Technology, the Indian Council for Medical Research (ICMR), the top authorizing body in India, has also given its approval for Convalescent Plasma Therapy as a treatment for patients with severe COVID-19 cases. In this method, the antibodies from the recovered patients are injected into a critically ill patient to boost their fight against the virus. Plasma donation is almost like a blood donation. Donors are hooked to a device that will separate the plasma from red blood cells and the entire process takes about an hour. For donating plasma for COVID 19, person need to be a COVID 19 patient before and should be completely symptom-free, can donate after 14 days of recovery. One needs to be physically fit to qualify (rich in antibodies) for plasma donation.

Plasma Therapy is showcasing successful results, and while researchers are working to look for a cure or vaccine for COVID-19 this therapy is so far helping on critically ill patients.

For foreseeable future, 89 companies across the globe are in race to develop a vaccine, seven including the Oxford University candidate have advanced to human trials or clinical evaluation stage, according to the World Health Organization.

India is among the largest manufacturer of generic drugs and vaccines in the world. Now half a dozen Indian firms are developing vaccines against the virus that causes Covid-19.

One of them is Serum Institute of India, the world's largest vaccine maker by number of doses produced and sold globally. Serum, is mass-producing the vaccine candidate developed by the University of Oxford, which started testing it on humans last week, and is a leader in the global race to develop an antidote to the novel coronavirus. The vaccine takes the coronavirus' genetic material and injects it into a common cold virus that has been neutralized so it cannot spread in people. The modified virus will mimic COVID-19, triggering the immune system to fight off the imposter and providing protection against the real thing.

The experimental vaccine has reportedly worked in protecting rhesus macaque monkeys that were exposed to heavy quantities of COVID-19. Human testing is already underway, and scientists say they're hopeful a coronavirus vaccine will be widely available by September.

There's more. Hyderabad-based Bharat Biotech had announced a partnership with the University of Wisconsin Madison and US-based firm FluGen to make almost 300 million doses of a vaccine for global distribution. Zydus Cadilla is working on two vaccines, while Biological E, Indian Immunologicals, and Mynvax are developing a vaccine each. Another four or five home-grown vaccines are in early stages of development.

Fight against COVID-19

PM Modi lists 7 tasks to fight COVID-19

- Take care of elderly
- Practice social distancing
- Follow AYUSH ministry tips to boost immunity
- Look after the needy
- Don't fire people from jobs
- Respect COVID-19 fighters

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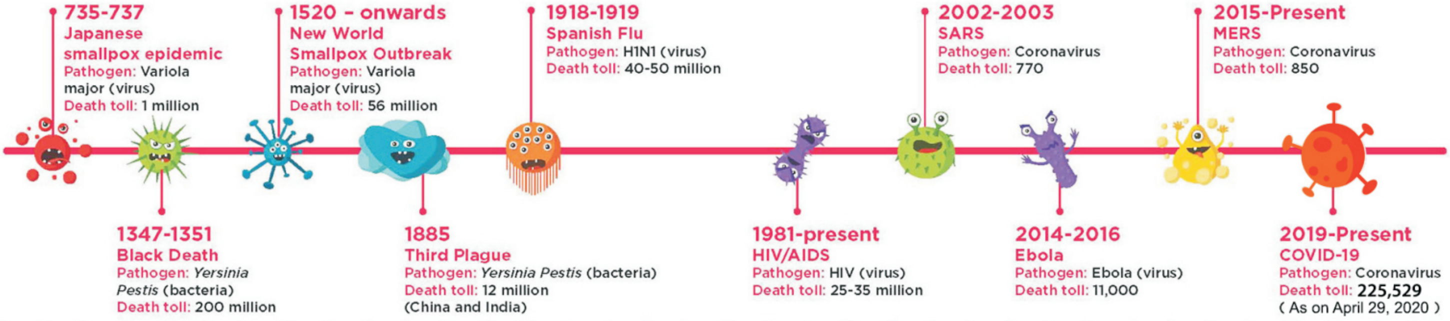
Pandemics in History



735-737
Japanese smallpox epidemic
Pathogen: Variola major (virus)
Death toll: 1 million

1347-1351
Black Death
Pathogen: *Yersinia Pestis* (bacteria)
Death toll: 200 million

1520 - onwards
New World Smallpox Outbreak
Pathogen: Variola major (virus)
Death toll: 56 million

1885
Third Plague
Pathogen: *Yersinia Pestis* (bacteria)
Death toll: 12 million
(China and India)

1918-1919
Spanish Flu
Pathogen: H1N1 (virus)
Death toll: 40-50 million

1981-present
HIV/AIDS
Pathogen: HIV (virus)
Death toll: 25-35 million

2002-2003
SARS
Pathogen: Coronavirus
Death toll: 770

2014-2016
Ebola
Pathogen: Ebola (virus)
Death toll: 11,000

2015-Present
MERS
Pathogen: Coronavirus
Death toll: 850

2019-Present
COVID-19
Pathogen: Coronavirus
Death toll: 225,529
(As on April 29, 2020)

Donate COVID-19 Plasma, Save critically ill COVID-19 patients.

Self-Care

As of now there is no medicine for Covid-19 pandemic, we all know that prevention is better than cure. It will be good to practice personal hygiene, wearing mask when going out, take preventive steps which boost immunity in these times.

Ministry of AYUSH recommends some self-care guidelines for preventive health measures and boosting immunity with special reference to respiratory health. These are supported by Ayurvedic literature and scientific publications.

Measures for Enhancing Immunity

- Drink warm water throughout the day.
  Daily practice of Yogasana, Pranayama and meditation for at least 30 minutes.
- Spices like Haldi (Turmeric), Jeera (Cumin), Dhaniya (Coriander) and Lahsun (Garlic) are recommended in cooking.

Ayurvedic Immunity Enhancing Tips

- Take Chyavanprash 10gm (1tsf) in the morning. Diabetics should take sugar free Chyavanprash.
- Drink herbal tea / decoction (Kadha) made from Tulsi (Basil), Dalchini (Cinnamon), Kalimirch (Black pepper), Shunthi (Dry Ginger) and Munakka (Raisin) - once or twice a day. Add jaggery (natural sugar) and / or fresh lemon juice to your taste, if needed.
- Golden Milk- Half tea spoon Haldi (turmeric) powder in 150 ml hot milk - once or twice a day.

Homoeopathy

Arsenicum album 30, daily once in empty stomach for three days. The dose should be repeated after one month by following the same schedule till Corona virus infections prevalent in the community.

Simple Ayurvedic Procedures

- **Nasal application** - Apply sesame oil / coconut oil or Ghee in both the nostrils (Pratimarsh Nasya) in morning and evening.
- **Oil pulling therapy** - Take 1 table spoon sesame or coconut oil in mouth. Do not drink, Swish in the mouth for 2 to 3 minutes and spit it off followed by warm water rinse. This can be done once or twice a day.

During Dry Cough / Sore Throat

- Steam inhalation with fresh Pudina (Mint) leaves or Ajwain (Caraway seeds) can be practiced once in a day.
- Lavang (Clove) powder mixed with natural sugar / honey can be taken 2-3 times a day in case of cough or throat irritation.
- These measures generally treat normal dry cough and sore throat. However, it is best to consult doctors if these symptoms persist.

Ayush Kwath recipe for immunity

TULSI LEAVES
4 PARTS

DALCHEENI
2 PARTS

SUNTHI / ADRAK
2 PARTS

KALI MIRCH
1 PART

Ingredients:
Tulsi (Ocimum sanctum) leaves – 4 parts
Dalchini (Cinnamomum zeylanicum) stem bark – 2 parts
Sunthi (Zingiber officinale) rhizome – 2 parts
Krishna Marich (Piper nigrum) fruit – 1 part

Ayush ministry promoting Kwath formulation in the interest of health promotion of the masses, which has been endorsed by the Hon'ble Prime Minister.

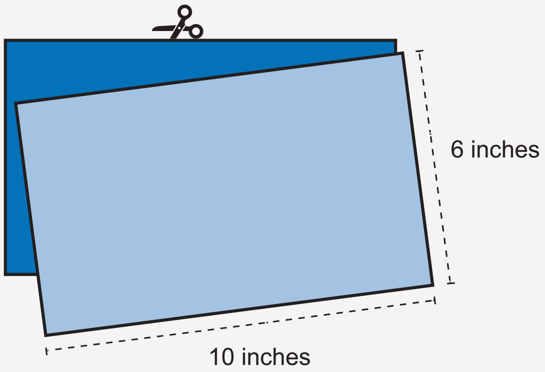
Procedure:
Dissolve 3gm powder (comprising all ingredients) in 150ml hot boiled water. You can add gud or gur (jaggery)/draksha (resins) and lemon juice to your decoction.

According to the ministry, the decoction can be consumed once or twice daily to help strengthen your immunity against COVID-19. The formulation, which may be manufactured and sold in generic name as 'Ayush Kwath' or 'Ayush Kudineer' or 'Ayush Joshanda', is suitable for consuming like tea or hot beverage every day.

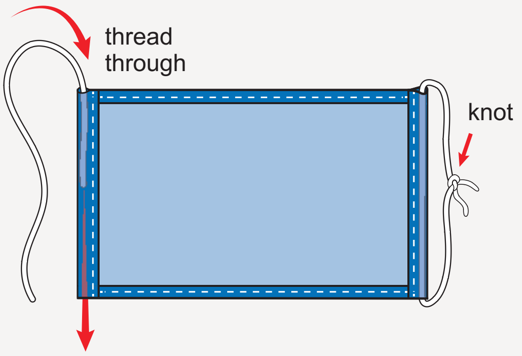
Disclaimer: The above advisory does not claim to be treatment for COVID 19.

Make your own face mask

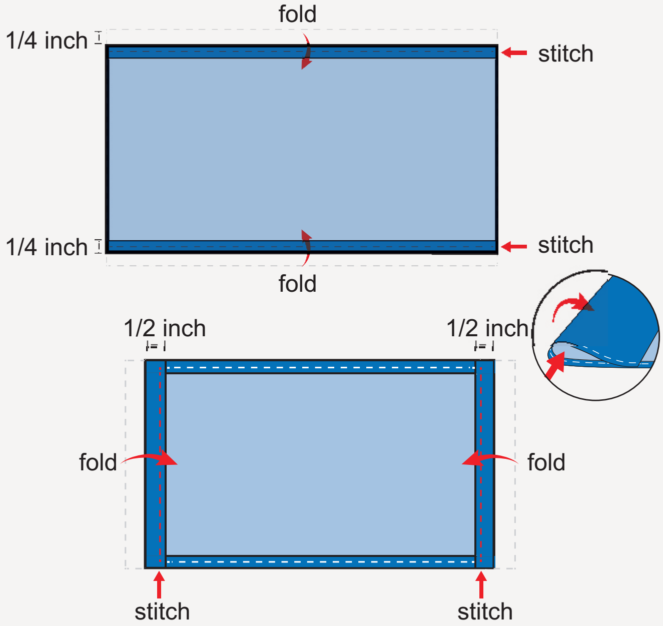
1 Cut out two 10-by-6-inch rectangles of cotton fabric. Use tightly woven cotton, such as quilting fabric or cotton sheets. T-shirt fabric will work in a pinch. Stack the two rectangles; you will sew the cloth face covering as if it was a single piece of fabric.



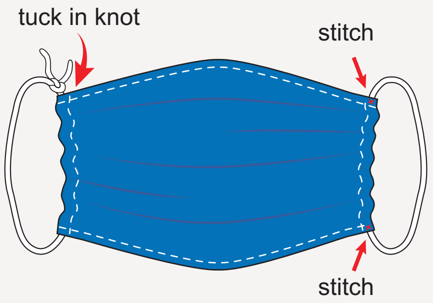
3 Run a 6-inch length of 1/8-inch wide elastic through the wider hem on each side of the cloth face covering. These will be the ear loops. Use a large needle or a bobby pin to thread it through. Tie the ends tight.
Don't have elastic? Use hair ties or elastic head bands. If you only have string, you can make the ties longer and tie the cloth face covering behind your head.



2 Fold over the long sides ¼ inch and hem. Then fold the double layer of fabric over ½ inch along the short sides and stitch down.



4 Gently pull on the elastic so that the knots are tucked inside the hem.
Gather the sides of the cloth face covering on the elastic and adjust so the mask fits your face. Then securely stitch the elastic in place to keep it from slipping.



I sincerely acknowledge all the online resources which have helped me in bringing this booklet.

How to clean and sanitize your homemade mask everyday

1. Thoroughly wash the mask in soap and warm water and leave it to dry in hot sun for at least 5 hours.

If you do not have access to the sun, follow Option 2:

2. Place the mask in water (add little salt to the water) in a pressure cooker and pressure boil it for at least 10 minutes and leave it to dry. In the absence of a pressure cooker, boil the cloth mask in hot water for 15 minutes.

If you do not have access to a pressure cooker/boiling water, follow Option 3:

3. Wash and clean with soap and apply heat on the mask for up to five minutes. (You may use an iron).

Do not attempt to clean and boil disposable masks. They have material that cannot withstand washing.

Inspire Educational Society is a non profit organization which aims to communicate science and technology among children and public through various media, innovative, exciting hands-on activities and science popularization programs.

http://www.inspire-edu-soc.in/

Central Helpline for Coronavirus:
+91-11-23978046

Andhra Pradesh: 0866-2410978
Telangana: 104